Plenary Lecture: Translating Biomechanics Research into Clinical Practice

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There is a large amount of research conducted each year examining every aspect of the mechanics of the human body and its interaction with medical devices and the environment; from the cellular level through to the whole body. While, as researchers, we obtain great pleasure from conducting studies and creating new knowledge we need to keep in mind that while this is a good thing it is even better if this new knowledge can lead to improvement in the quality of life for individuals suffering from biomechanical disorders.

There are examples of the successful translation of biomechanical research into clinical practice but if we consider the number of individuals and institutions involved in research then it is legitimate to question what the benefit really is.

In reviewing outcomes of research it is important to consider not only the relatively few commercial successes but also evidence for the benefit to clinical practice more generally. It becomes clear that research often leads to incremental improvements in design and service provision as researchers work with clinicians to understand and solve their day-to-day problems.

We have available many sophisticated tools to analyse biomechanical issues and these can be used to provide evidence for clinicians to change their practice to improve outcomes for individual patients and for companies to modify the design of their devices so that they are available for more diverse populations. For example: modern mechanical testing methods combined with modelling techniques can assist engineers and surgeons in designing total joint replacement components that will suit different populations; and three dimensional reconstructions from medical imaging and finite element studies can assist spinal surgeons to plan spinal deformity correction surgery. In addition, quite simple biomechanical analyses can provide answers that assist clinical practice by clarifying why devices fail the way they do and enable changes to surgical techniques to be developed to reduce the likelihood of failure. So sometimes relatively simple mechanical analyses can provide important insights into clinical problems and suggest effective solutions.

In summary, when considering translating biomechanical research into clinical practice, while commercialisation is a good aim, not all research leads to marketable outcomes. However, it can lead to improvements in surgical techniques and clinical practice. It is important for us to identify and promote how the outcomes of research lead to improvements in quality of care, as this is perhaps the most important outcome for individual patients.